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1 [A facility for defining and manipulating generalized data structures](#)



Billy G. Claybrook

December 1977 **ACM Transactions on Database Systems (TODS)**, Volume 2 Issue 4

Publisher: ACM Press

Full text available: [pdf\(2.87 MB\)](#)
 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A data structure definition facility (DSDF) is described that provides definitions for several primitive data types, homogeneous and heterogeneous arrays, cells, stacks, queues, trees, and general lists. Each nonprimitive data structure consists of two separate entities—a head and a body. The head contains the entry point(s) to the body of the structure; by treating the head like a cell, the DSDF operations are capable of creating and manipulating very general data structures. A templ ...

Keywords: data definition languages, data structure definition facility, data structures, database management

2 [Data model for extensible support of explicit relationships in design databases](#)



Joan Peckham, Bonnie MacKellar, Michael Doherty

April 1995 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 4 Issue 2

Publisher: Springer-Verlag New York, Inc.

Full text available: [pdf\(2.01 MB\)](#)
 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

We describe the conceptual model of SORAC, a data modeling system developed at the University of Rhode Island. SORAC supports both semantic objects and relationships, and provides a tool for modeling databases needed for complex design domains. SORAC's set of built-in semantic relationships permits the schema designer to specify enforcement rules that maintain constraints on the object and relationship types. SORAC then automatically generates C++ code to maintain the specified enforcement rules ...

Keywords: computer-aided architectural design, database constraints, relationship semantics, semantic and object-oriented data modeling

3 [LH*_{RS}---a highly-available scalable distributed data structure](#)



Witold Litwin, Rim Moussa, Thomas Schwarz

September 2005 **ACM Transactions on Database Systems (TODS)**, Volume 30 Issue 3

Publisher: ACM Press

Full text available:  pdf(774.32 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

LH*RS is a high-availability scalable distributed data structure (SDDS). An LH*RS file is hash partitioned over the distributed RAM of a multicomputer, for example, a network of PCs, and supports the unavailability of any $k \geq 1$ of its server nodes. The value of k transparently grows with the file to offset the reliability decline. Only the number of the storage nodes potentially limits the file growth. The high-availability management uses a novel ...

Keywords: P2P, Scalable distributed data structure, grid computing, high-availability, linear hashing, physical database design

4 [Comparison of access methods for time-evolving data](#)



Betty Salzberg, Vassilis J. Tsotras

June 1999 **ACM Computing Surveys (CSUR)**, Volume 31 Issue 2

Publisher: ACM Press

Full text available:  pdf(529.53 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper compares different indexing techniques proposed for supporting efficient access to temporal data. The comparison is based on a collection of important performance criteria, including the space consumed, update processing, and query time for representative queries. The comparison is based on worst-case analysis, hence no assumptions on data distribution or query frequencies are made. When a number of methods have the same asymptotic worst-case behavior, features in the methods tha ...

Keywords: I/O performance, access methods, structures, temporal databases


5 [Adaptable concurrency control for atomic data types](#)



M. S. Atkins, M. Y. Coady

August 1992 **ACM Transactions on Computer Systems (TOCS)**, Volume 10 Issue 3

Publisher: ACM Press

Full text available:  pdf(2.54 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

In many distributed systems concurrent access is required to a shared object, where abstract object servers may incorporate type-specific properties to define consistency requirements. Each operation and its outcome is treated as an event, and conflicts may occur between different event types. Hence concurrency control and synchronization are required at the granularity of conflicting event types. With such a fine granularity of locking, the occurrence of conflicts is likely to be lower tha ...

Keywords: concurrent access to shared data, hybrid locking, optimistic locking, pessimistic locking, transactions serializability


6 [Tools and transformations—rigorous and otherwise—for practical database design](#)



Arnon Rosenthal, David Reiner

June 1994 **ACM Transactions on Database Systems (TODS)**, Volume 19 Issue 2

Publisher: ACM Press

Full text available:  pdf(3.19 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

We describe the tools and theory of a comprehensive system for database design, and show how they work together to support multiple conceptual and logical design processes. The Database Design and Evaluation Workbench (DDEW) system uses a rigorous,

information-content-preserving approach to schema transformation, but combines it with heuristics, guess work, and user interactions. The main contribution lies in illustrating how theory was adapted to a practical system, and how the consistency ...

Keywords: applications of database theory, computer-aided software engineering, data model translation, database design, database equivalence, design heuristics, entity-relationship model, heuristics, normalization, view integration

7 A predicate-based caching scheme for client-server database architectures

Arthur M. Keller, Julie Basu

January 1996 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 5 Issue 1


Publisher: Springer-Verlag New York, Inc.

Full text available:  [pdf\(162.80 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

We propose a new client-side data-caching scheme for relational databases with a central server and multiple clients. Data are loaded into each client cache based on queries executed on the central database at the server. These queries are used to form predicates that describe the cache contents. A subsequent query at the client may be satisfied in its local cache if we can determine that the query result is entirely contained in the cache. This issue is called *cache completeness*. A separ ...


Keywords: Cache completeness, Cache currency, Caching, Multiple clients, Relational databases

8 Security-control methods for statistical databases: a comparative study

 Nabil R. Adam, John C. Worthmann

December 1989 **ACM Computing Surveys (CSUR)**, Volume 21 Issue 4

Publisher: ACM Press

Full text available:  [pdf\(3.64 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

This paper considers the problem of providing security to statistical databases against disclosure of confidential information. Security-control methods suggested in the literature are classified into four general approaches: conceptual, query restriction, data perturbation, and output perturbation. Criteria for evaluating the performance of the various security-control methods are identified. Security-control methods that are based on each of the four approaches are discussed, t ...

9 Fast detection of communication patterns in distributed executions

Thomas Kunz, Michiel F. H. Seuren

November 1997 **Proceedings of the 1997 conference of the Centre for Advanced Studies on Collaborative research**


Publisher: IBM Press

Full text available:  [pdf\(4.21 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Understanding distributed applications is a tedious and difficult task. Visualizations based on process-time diagrams are often used to obtain a better understanding of the execution of the application. The visualization tool we use is Poet, an event tracer developed at the University of Waterloo. However, these diagrams are often very complex and do not provide the user with the desired overview of the application. In our experience, such tools display repeated occurrences of non-trivial commun ...

10 An execution model for limited ambiguity rules and its application to derived data update


 I.-Min A. Chen, Richard Hull, Dennis McLeod
December 1995

Publisher: ACM PressFull text available:  [pdf\(3.36 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A novel execution model for rule application in active databases is developed and applied to the problem of updating derived data in a database represented using a semantic, object-based database model. The execution model is based on the use of "limited ambiguity rules" (LARs), which permit disjunction in rule actions. The execution model essentially performs a breadth-first exploration of alternative extensions of a user-requested update. Given an object-based database schema, ...

Keywords: active database systems, deltas on database states, derived data, limited ambiguity rules, semantic data models, update propagation



11 [Formal query languages for secure relational databases](#)

 Marianne Winslett, Kenneth Smith, Xiaolei Qian
December 1994 **ACM Transactions on Database Systems (TODS)**, Volume 19 Issue 4**Publisher:** ACM PressFull text available:  [pdf\(2.43 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The addition of stringent security specifications to the list of requirements for an application poses many new problems in DBMS design and implementation, as well as database design, use, and maintenance. Tight security requirements, such as those that result in silent masking of withholding of true information from a user or the introduction of false information into query answers, also raise fundamental questions about the meaning of the database and the semantics of accompanying query la ...



Keywords: formal security models, information security, multilevel secure databases

12 [Concurrency control in advanced database applications](#)

 Naser S. Barchouti, Gail E. Kaiser
September 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 3**Publisher:** ACM PressFull text available:  [pdf\(4.69 MB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: advanced database applications, concurrency control, cooperative transactions, design environments, extended transaction models, long transactions, object-oriented databases, relaxing serializability

13 [ODE \(Object Database and Environment\): the language and the data model](#)

 R. Agrawal, N. H. Gehani
June 1989 **ACM SIGMOD Record , Proceedings of the 1989 ACM SIGMOD international conference on Management of data SIGMOD '89**, Volume 18 Issue 2**Publisher:** ACM PressFull text available:  [pdf\(1.26 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

ODE is a database system and environment based on the object paradigm. It offers one integrated data model for both database and general purpose manipulation. The database is defined, queried and manipulated in the database programming language O++ which is based on C++. O++ borrows and extends the object definition facility of C++, called the class. Classes support data encapsulation and multiple inheritance. We provide facilities

for creating persistent and versioned objects, defining set ...

14 Proposed NIST standard for role-based access control



David F. Ferraiolo, Ravi Sandhu, Serban Gavrila, D. Richard Kuhn, Ramaswamy Chandramouli

August 2001 **ACM Transactions on Information and System Security (TISSEC)**, Volume 4 Issue 3

Publisher: ACM Press

Full text available: [pdf\(417.90 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this article we propose a standard for role-based access control (RBAC). Although RBAC models have received broad support as a generalized approach to access control, and are well recognized for their many advantages in performing large-scale authorization management, no single authoritative definition of RBAC exists today. This lack of a widely accepted model results in uncertainty and confusion about RBAC's utility and meaning. The standard proposed here seeks to resolve this situation by u ...

Keywords: Role-based access control, access control, authorization management, security, standards

15 A database model for object dynamics

M. P. Papazoglou, B. J. Krämer

May 1997 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 6 Issue 2

Publisher: Springer-Verlag New York, Inc.

Full text available: [pdf\(313.64 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

To effectively model complex applications in which constantly changing situations can be represented, a database system must be able to support the runtime specification of structural and behavioral nuances for objects on an individual or group basis. This paper introduces the role mechanism as an extension of object-oriented databases to support unanticipated behavioral oscillations for objects that may attain many types and share a single object identity. A role refers to the ability to repres ...

Keywords: Dynamic class hierarchy, Dynamic object re-classification, Object migration, Object role model, Object-oriented database systems

16 LH*RS: a high-availability scalable distributed data structure using Reed Solomon



Codes

Witold Litwin, Thomas Schwarz

May 2000 **ACM SIGMOD Record , Proceedings of the 2000 ACM SIGMOD international conference on Management of data SIGMOD '00**, Volume 29 Issue 2

Publisher: ACM Press

Full text available: [pdf\(155.52 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

LH*RS is a new high-availability Scalable Distributed Data Structure (SDDS). The data storage scheme and the search performance of LH*RS are basically these of LH*. LH*RS manages in addition the parity information to tolerate the unavailability of $k + 1$ server sites. The value of k scales with the file, to prevent the reliability decline. The parity calculus uses the Reed -Solomon Codes. The storage and access performance over ...

Keywords: Reed-Solomon Codes, SDDS, high-availability, scalable

Sharing and protection in a single-address-space operating system

Jeffrey S. Chase, Henry M. Levy, Michael J. Feeley, Edward D. Lazowska

November 1994 **ACM Transactions on Computer Systems (TOCS)**, Volume 12 Issue 4**Publisher:** ACM PressFull text available: [pdf\(2.87 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This article explores memory sharing and protection support in Opal, a single-address-space operating system designed for wide-address (64-bit) architectures. Opal threads execute within protection domains in a single shared virtual address space. Sharing is simplified, because addresses are context independent. There is no loss of protection, because addressability and access are independent; the right to access a segment is determined by the protection domain in which a thread executes. T ...

Keywords: 64-bit architectures, capability-based systems, microkernel operating systems, object-oriented database systems, persistent storage, protection, single-address-space operating systems, wide-address architectures

18 Using histories to implement atomic objects

Tony P. Ng

November 1989 **ACM Transactions on Computer Systems (TOCS)**, Volume 7 Issue 4**Publisher:** ACM PressFull text available: [pdf\(2.74 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

In this paper we describe an approach to implementing atomicity. Atomicity requires that computations appear to be all-or-nothing and executed in a serialization order. The approach we describe has three characteristics. First, it utilizes the semantics of an application to improve concurrency. Second, it reduces the complexity of application-dependent synchronization code by analyzing the process of writing it. Third, our approach hides the protocol used to arrive at a ser ...

19 TransformGen: automating the maintenance of structure-oriented environments

David Garlan, Charles W. Krueger, Barbara Staudt Lerner

May 1994 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 16 Issue 3**Publisher:** ACM PressFull text available: [pdf\(3.10 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A serious problem for programs that use persistent data is that information created and maintained by the program becomes invalid if the persistent types used in the program are modified in a new release. Unfortunately, there has been little systematic treatment of the problem; current approaches are manual, ad hoc, and time consuming both for programmers and users. In this article we present a new approach. Focusing on the special case of managing abstract syntax trees in structure-oriented ...

Keywords: schema evolution, structure-oriented environments, type evolution

20 Compiling complex database transition triggers

D. Cohen

June 1989 **ACM SIGMOD Record , Proceedings of the 1989 ACM SIGMOD international conference on Management of data SIGMOD '89**, Volume 18 Issue 2**Publisher:** ACM PressFull text available: [pdf\(1.19 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper presents a language for specifying database updates, queries and rule triggers,

and describes how triggers can be compiled into an efficient mechanism. The rule language allows specification of both state and transition constraints as special cases, but is more general than either. The implementation we describe compiles rules and updates independently of each other. Thus rules can be added or deleted without recompiling any update program and vice versa.

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¹ The ARBAC97 model for role-based administration of roles



Ravi Sandhu, Venkata Bhamidipati, Qamar Munawer

February 1999 **ACM Transactions on Information and System Security (TISSEC)**, Volume 2 Issue 1

Publisher: ACM Press

Full text available:  pdf(208.29 KB).

Additional Information: [full citation](#), [abstract](#), [references](#), [citings](#), [index terms](#) :

In role-based access control (RBAC), permissions are associated with roles' and users are made members of roles, thereby acquiring the roles; permissions. RBAC's motivation is to simplify administration of authorizations. An appealing possibility is to use RBAC itself to manage RBAC, to further provide administrative convenience and scalability, especially in decentralizing administrative authority, responsibility, and chores. This paper describes the motivation, intuition, and formal defin ...

Keywords: authorization management, role based access control, security administration

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M Gribskov, AD McLachlan, D Eisenberg - Proc. Natl. Acad. Sci. USA, 1987 - pnas.org
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 ... Yet it is only the DBMS which can **prevent** other applications from corrupting ... There
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The ARBAC 97 model for role-based administration of roles

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D Denning - Proceedings of the IEEE symposium on Security and Privacy (... - doi.ieeecomputersociety.org

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KR Dittrich, R Lorie - IEEE Transactions on Software Engineering, 1988 - [ieeexplore.ieee.org](#)
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